

Measurements of the ^3He Coexistence Curve near the Liquid-Gas Critical Point Using a Quasistatic Thermogram Technique

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The liquid-gas coexistence curve of ^3He near the critical point was measured using the method of quasistatic thermograms, which reduces to monitoring the sample temperature during slow cooling (or heating) at constant average density across the transition temperature. Dependence of the thermograms on the cooling/heating rate was also studied. The experiment was performed in Earth's gravitational field using two different sample cells, both originally designed for the heat capacity and PVT measurements. The heights of two cells were 0.5 mm and 4 cm. The measured coexistence curve showed strong gravity effects near the critical point. The "restricted-cubic-model" parametric equation of state was used to analyze the effect of gravity near the critical point. The data was also compared with a time-dependent numerical simulation of the 1-D entropy diffusion equation (piston effect) model.